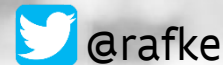


# Linked Data approach to unlock spatial objects

**SDI.Next: Linked Spatial Data in Europe**  
**March 12th, 2019**  
**Amersfoort, The Netherlands**



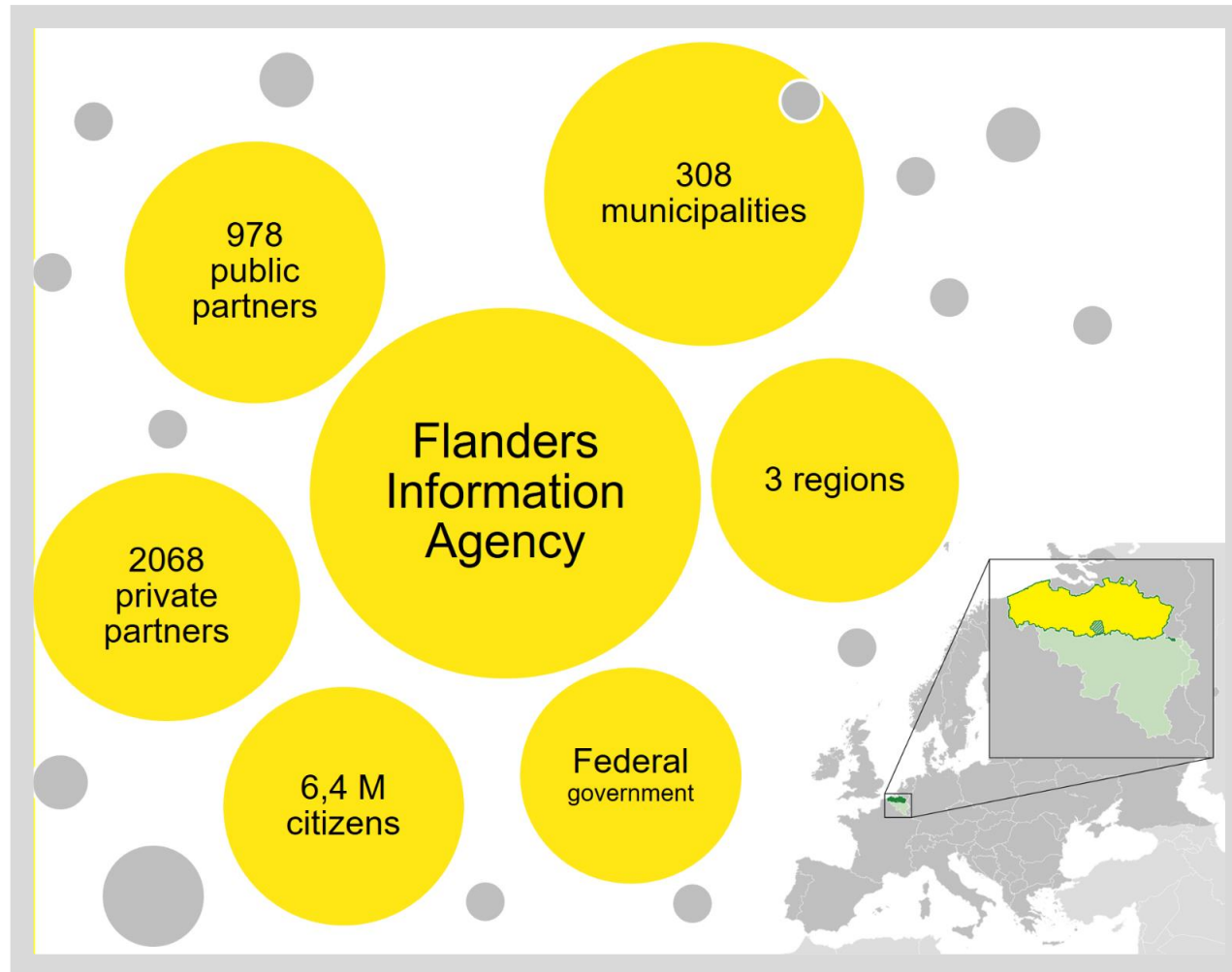
**Flanders**  
State of  
the Art



**INFORMATIE**  
**VLAANDEREN**

Photo by Henry Marsh on Pexels

# At the crossroads ●



**Flanders**  
State of the Art

**INFORMATIE  
VLAANDEREN**

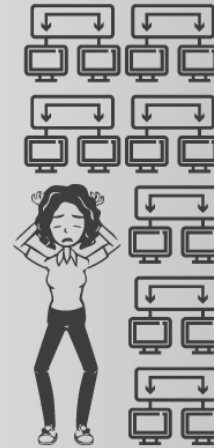
# OSLO – Grassroots initiative●



Local  
government



> 1000  
public services

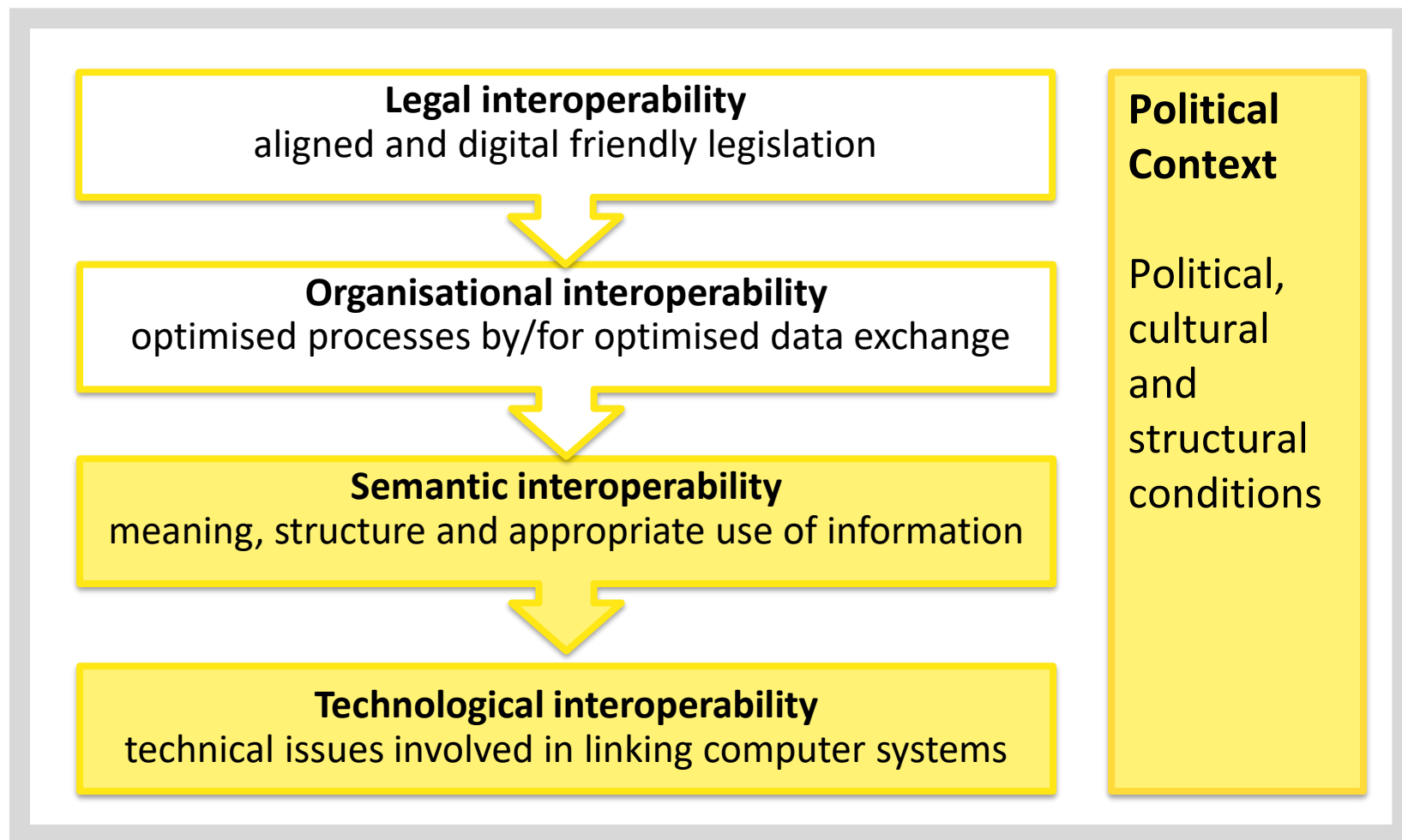


> 250  
Information  
Systems



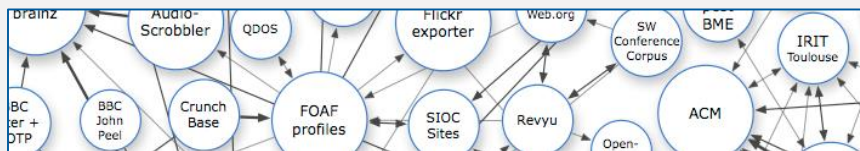
# adminis  
trations

# Interoperability levels ●



# Share and Re-use.

W3C  
International  
Standards



E.g for mobility Datex II, SIRI, NeTEx...

EU ISA CORE  
Vocabularies

CORE  
PERSON  
VOCABULARY

CORE  
BUSINESS  
VOCABULARY

CORE  
PUBLIC  
ORGANISATION  
VOCABULARY

DCAT-AP  
FOR  
DATA PORTALS  
IN EUROPE

OSLO  
Extention

OSLO  
PERSON  
VOCABULARY

OSLO  
BUSINESS  
VOCABULARY

OSLO  
ROAD  
VOCABULARY

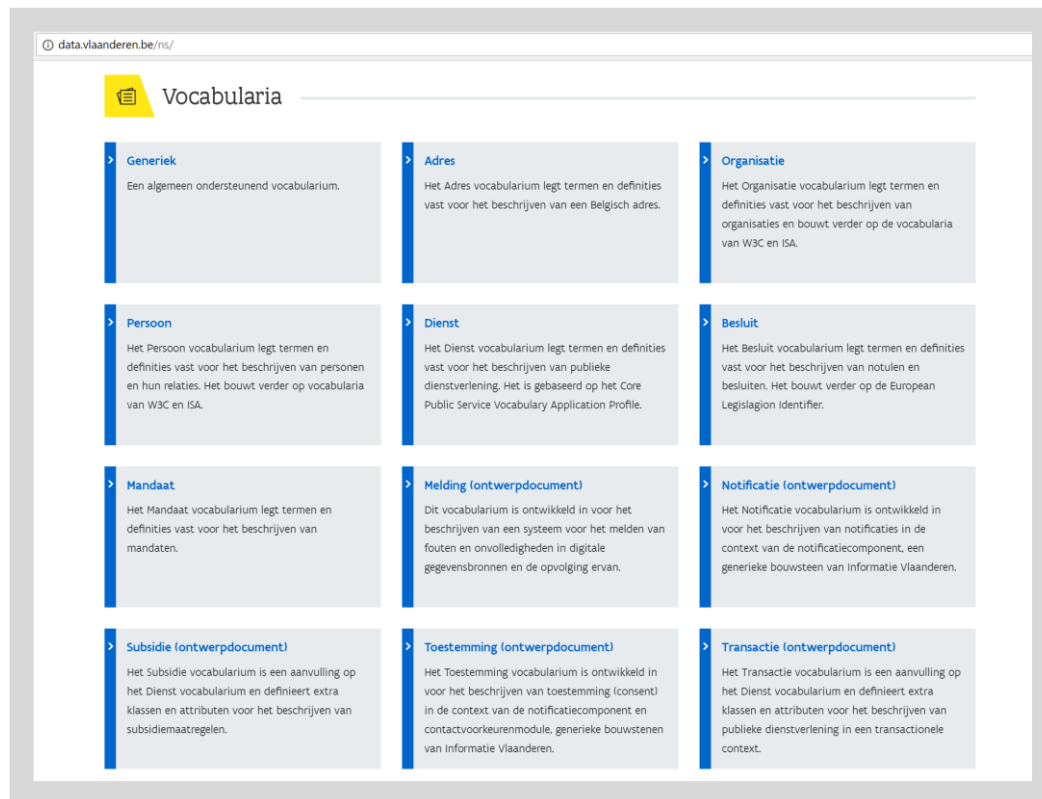
OSLO  
ORGANISATION  
VOCABULARY

OSLO  
DCAT-AP VL  
VOCABULARY



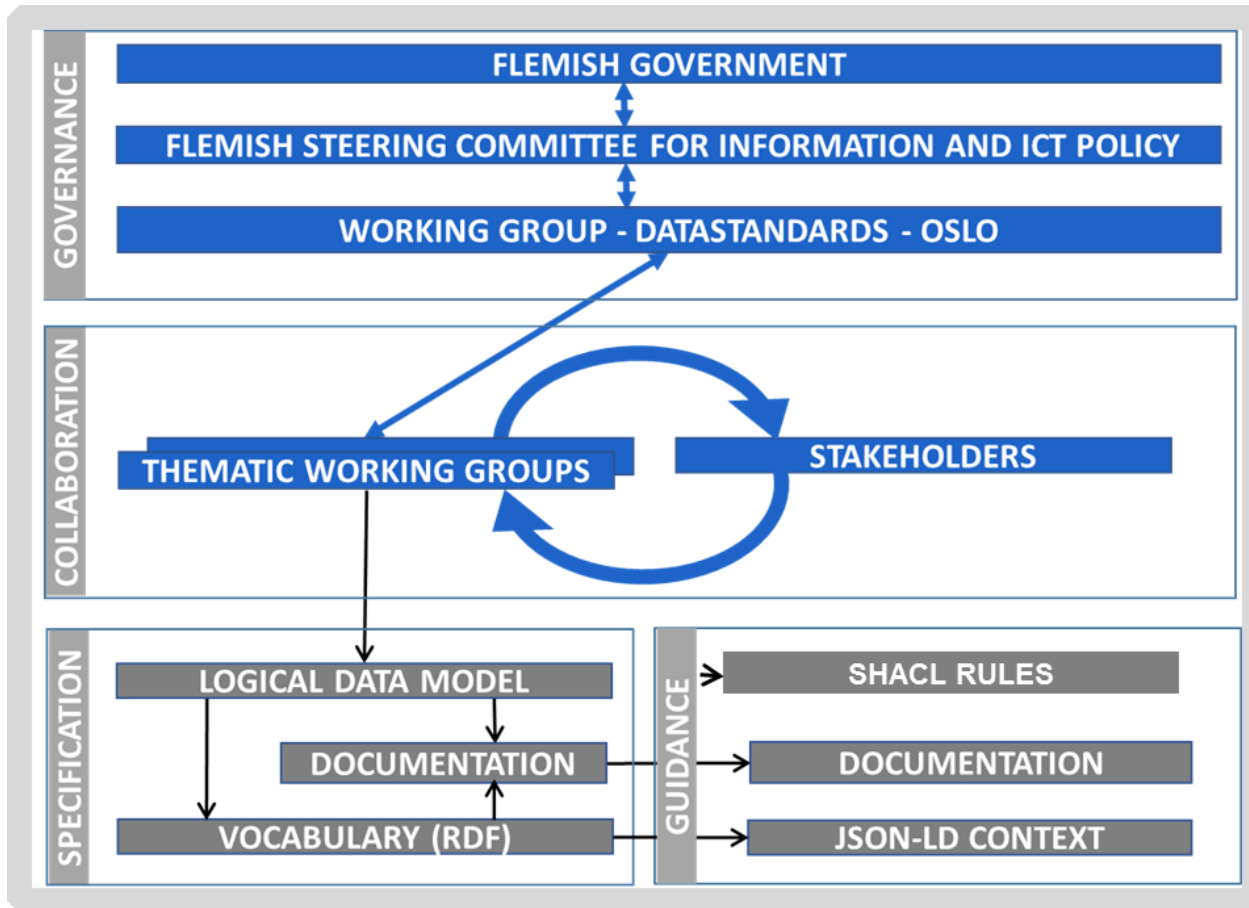
EU - ISA<sup>2</sup>  
Federal Government  
Regional Government  
Local Government  
Industry  
Academia

# data.vlaanderen.be



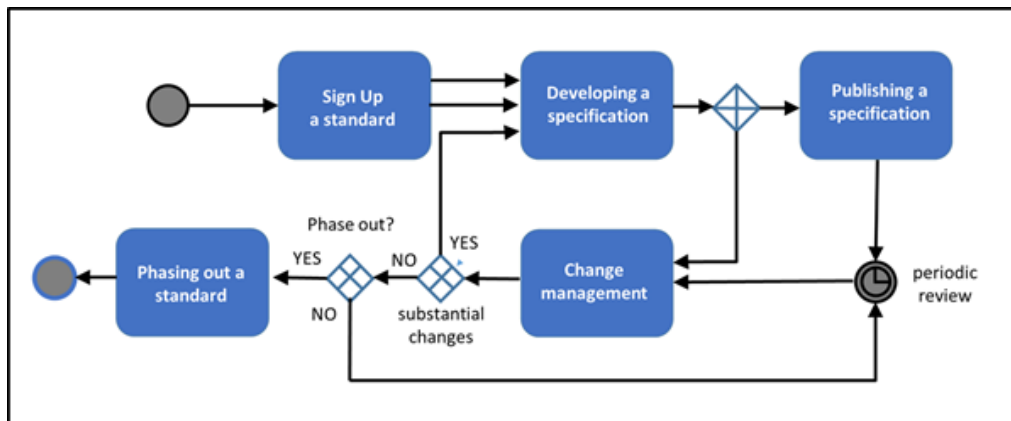
- > Person
- > Organisation
- > Address
- > Building
- > Road
- > Public Service
- > Transactional Services
- > Civic issue tracking
- > Notification
- > Consent (GDPR)
- > Contact preferences
- > Government Grants
- > Public Domain
- > Local Decisions
- > Political Mandate

# Process and method for developing data standards.



[https://data.vlaanderen.be/cms/Proces\\_en\\_methode\\_voor\\_de\\_erkennng\\_van\\_datastandaarden\\_v1.0.pdf](https://data.vlaanderen.be/cms/Proces_en_methode_voor_de_erkennng_van_datastandaarden_v1.0.pdf)

# Process for developing data standards.



The process to develop and maintain OSLO data standards, based on ISA, W3C and Open Stand



Collaborative development

Public review of a candidate standard



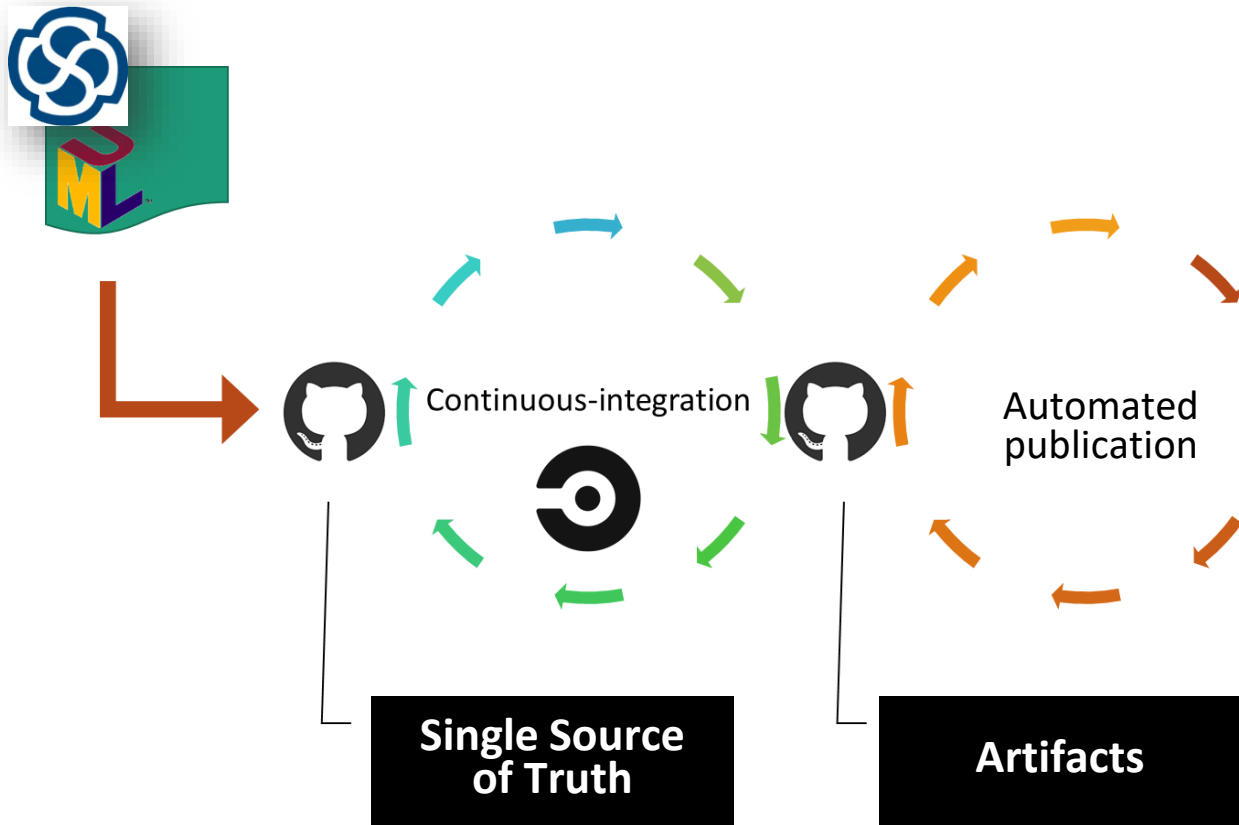
Build reference implementations



Acknowledge + publish as standard



# Method for developing data standards.



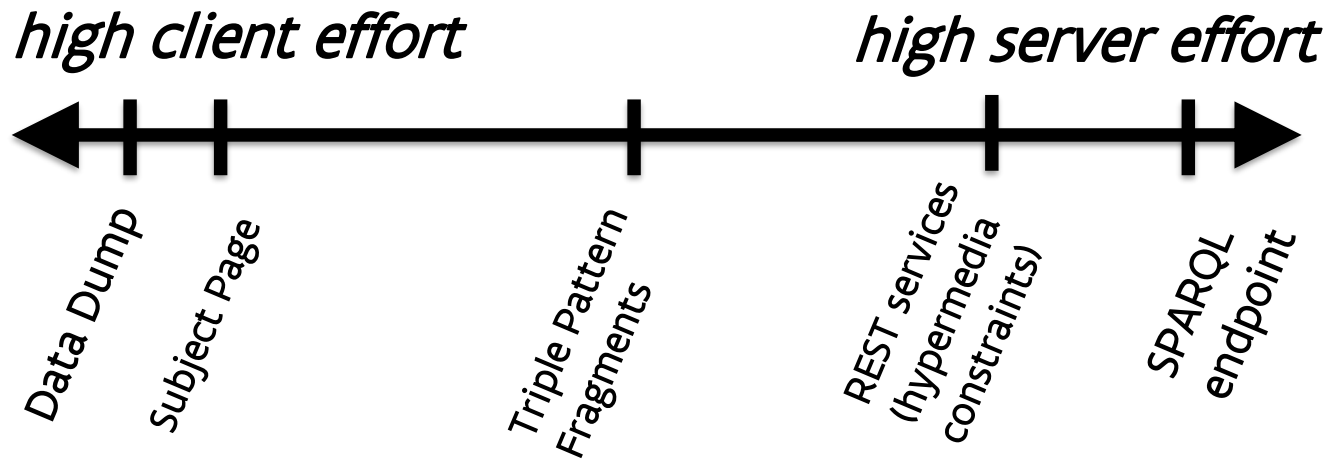
[data.vlaanderen.be/ns](https://data.vlaanderen.be/ns)

CORE vocabularies  
Application profiles  
JSON-LD  
SHACL

## Standardised distribution flow

# Linked Data Products.

There is more to Linked Data publishing than just the two extremes



<http://linkeddatafragments.org/>

# Semantic and syntactic Interoperability ●



Photo by NeONBRAND on Unsplash



# The Web as a blueprint

[https://bit.ly/joinup\\_uri](https://bit.ly/joinup_uri)

Persistent Identifiers: URIs

<http://data.vlaanderen.be/id/adres/3706808>



Dereferenceable HTTP URIs

Standardised Information (RDF)

Links to other information

Koningin Maria Hendrikaplein  
70,  
9000 Gent

# Machine readable

context / Konteks  
words that  
ord or a

JSON

```
{  
  "voorkeursnaam": "Agentschap Informatie Vlaanderen",  
  "alternatieveNaam": "AIV"  
}
```



JSON-LD

```
{  
  "@context": "http://data.vlaanderen.be/context/organisatie.jsonld",  
  "@id": "http://data.vlaanderen.be/id/organisatie/OVO002949",  
  "@type": "Organisatie",  
  "voorkeursnaam": "Agentschap Informatie Vlaanderen",  
  "alternatieveNaam": "AIV"  
}
```

**The context of the conversation & JSON-LD**  
a lightweight Linked Data format,  
based on the successful JSON format  
facilitates machine-readable data  
[Generated by the OSLO toolchain]

# Conformance

independe  
audit.

```
504 ▼ dienst:PublicServiceShape
505   a sh:NodeShape ;
506   sh:targetClass <http://purl.org/vocab/cpsv#PublicService> ;
507 ▼ sh:property [
508   sh:name "naam" ;
509   sh:description "Officiële naam van de publieke dienstverlening." ;
510   sh:datatype <http://www.w3.org/1999/02/22-rdf-syntax-ns#langString> ;
511   sh:minCount 1 ;
512   sh:maxCount 1 ;
513   sh:path <http://purl.org/dc/terms/title> ;
514 ] ;
515 ▼ sh:property [
516   sh:name "heeftVerantwoordelijke" ;
517   sh:description "Publieke organisatie die verantwoordelijk is voor
518   het aanbieden en beheren van de publieke dienstverlening." ;
519   sh:class <http://data.europa.eu/m8g/PublicOrganisation> ;
520   sh:minCount 1 ;
521   sh:maxCount 1 ;
522   sh:path <http://purl.org/dc/terms/creator> ;
523 ] ;
```

## Shapes Constraint Language

W3C Recommendation

A language for validating RDF graphs  
against a set of conditions

[Generated by the OSLO toolchain / SHACL validator]



# Technical Interoperability ●

Photo by Alexandre Debiève on Unsplash



# Hypermedia Driven APIs ●

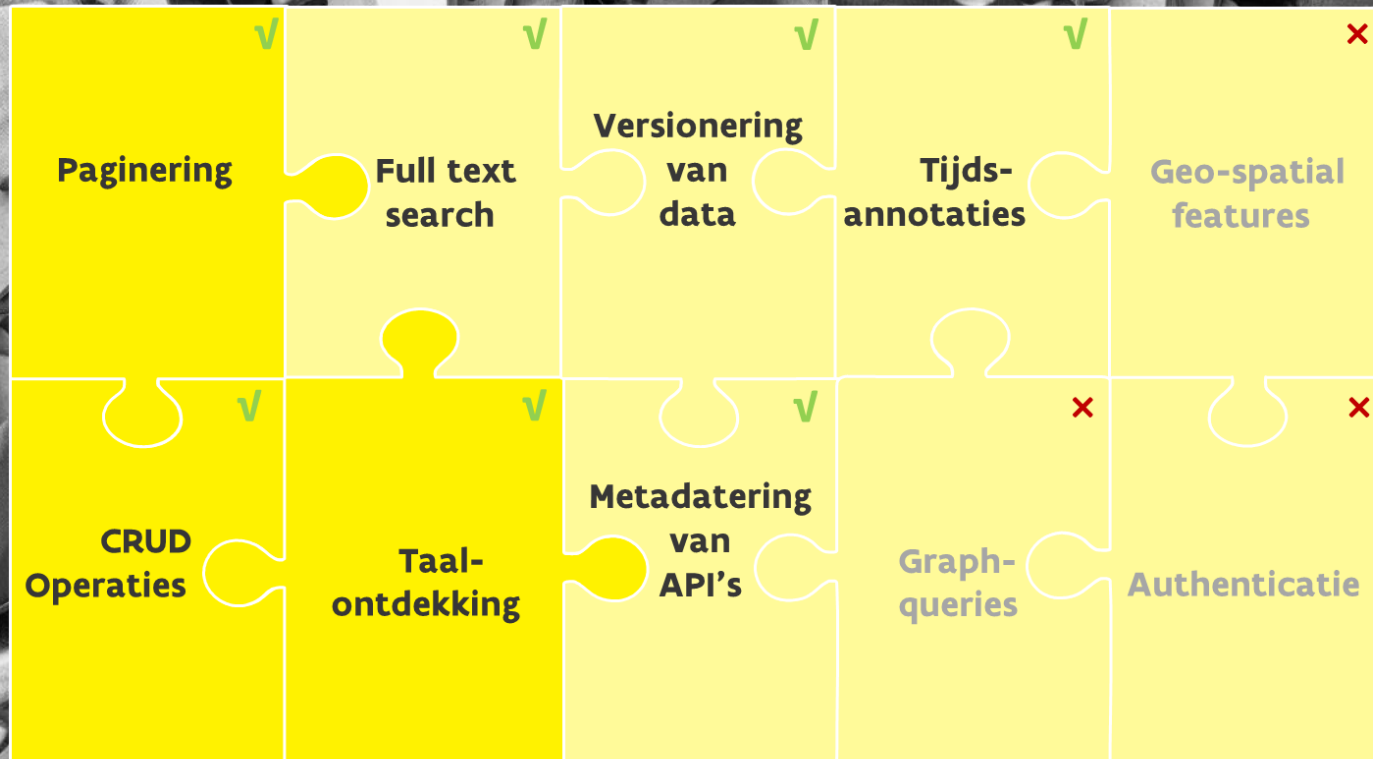


Photo by Hans-Peter Gauster on Unsplash





# Use-Cases ●

Photo by David Siglin on Unsplash

# Management of the public domain ●



Uitbreiding vegetatie-elementen



Uitbreiding infrastructuurelementen



Uitbreiding gebieden



Uitbreiding terreindelen



Uitbreiding waterdelen



Uitbreiding begraafplaatsen

## Large Scale Reference Database

- Objects in the public domain related to: vegetation, infrastructure, cemeteries, ...
- Smart combination of spatial and non-spatial information



# Smart Cities - Digital Twin ●

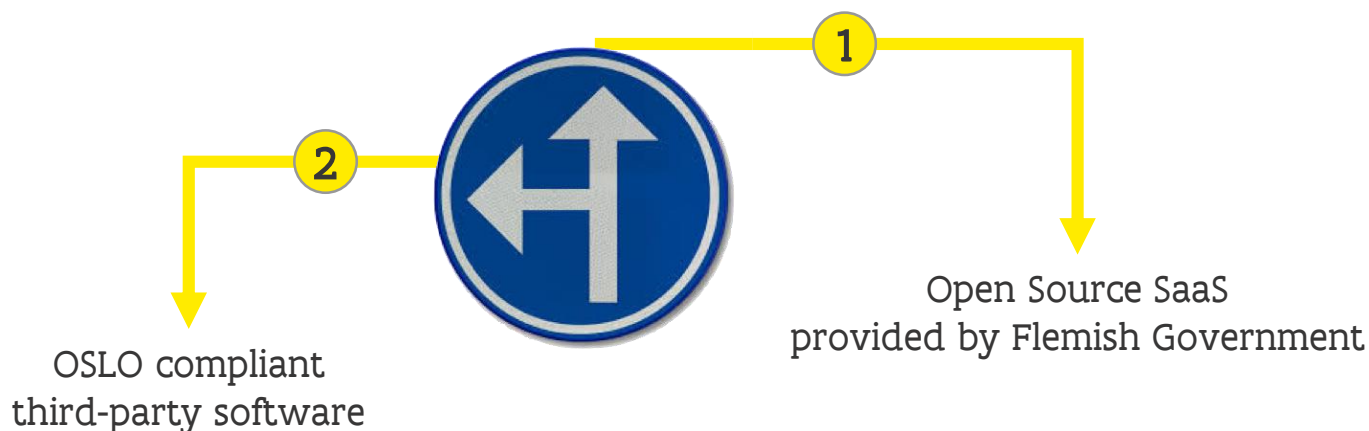


**Building Information Modelling**

# Imagine ●



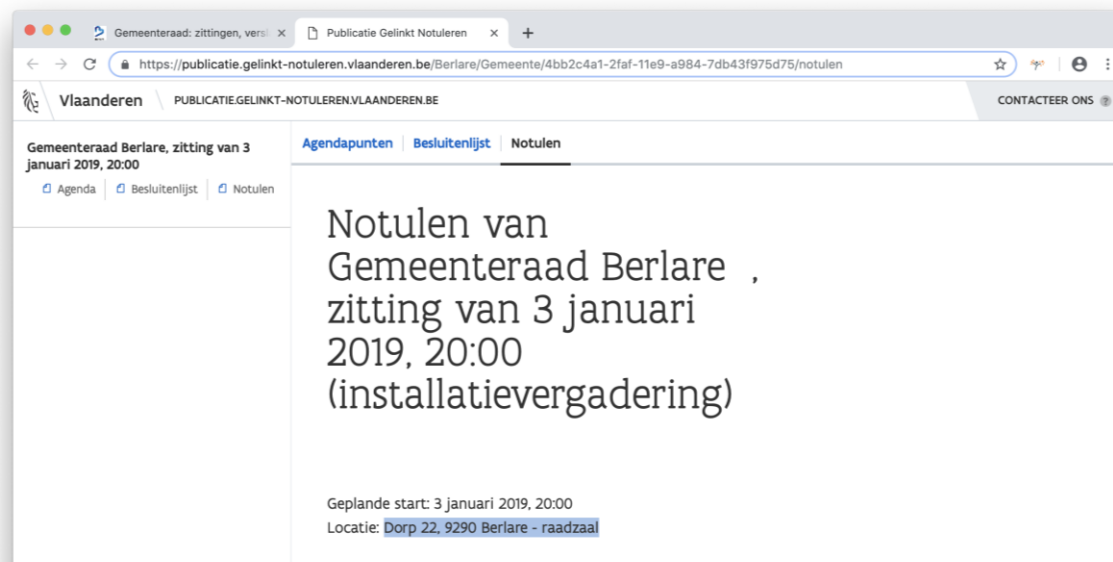
# Publication of council decisions as Linked Open Data ●



Open Source: <https://github.com/lblod/>

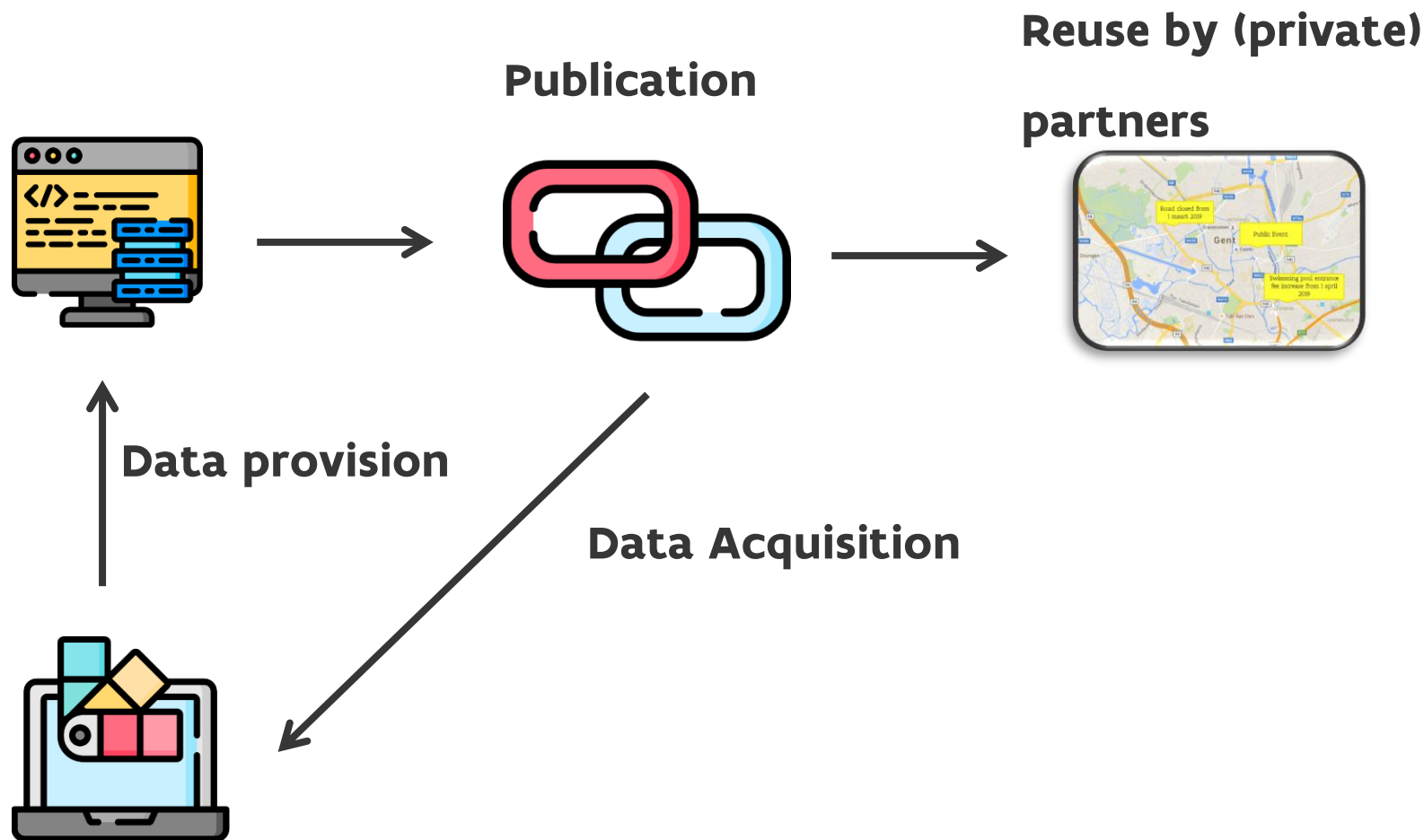


# Publication of council decisions as Linked Open Data ●



```
<span property="prov:value">
<span property="ext:bekrachtigtAanstellingVan" resource="http://data.lblod.info/id/mandatarissen/ca8151d2-01d7-4ae6-ba87-2404805c4255" typeof="mandaat:Mandataris">De voorgedragen kandidaat-voorzitter,
<span class="mark-highlight-manual">
<span property="http://data.vlaanderen.be/ns/mandaat#isBestuurlijkeAliasVan" typeof="http://www.w3.org/ns/person#Person"
resource="http://data.lblod.info/id/personen/320835b0b1a58aac12d261a58ce11bf510c0090af85b1b323ecd1242ddb2271b">Karel De Gucht
</span>
</span>
, wordt verkozen verklaard als
<span property="ext:currentVoorzitterMandaat">
<span class="u-hidden" property="ext:currentVoorzitterMandaatBestuursorgaan"
resource="http://data.lblod.info/id/bestuursorganen/778afd80d12ab7044741a5e78cedd964dfb14c041432d5b8c234f0b4523162b8">&nbsp;
</span>
<span property="org:holds" resource="http://data.lblod.info/id/mandaten/200dea42e3ecc6a26a1d0b606f4d924267eea9456ce4b2a1a09f7b2b587eba63">
voorzitter van de gemeenteraad met ingang van
</span>
<span property="mandaat:start" content="2019-01-03T19:25:00.000Z" datatype="xsd:dateTime">3 januari 2019, 20:25
</span>
</span>
</span>
```

# Unlocking the full potential of Spatial Linked Data ●



# **Wrap-Up ●**

**Unlock the full potential  
of (Spatial) Linked Data by:**

- 1. The Application of a consensus based standardisation process**
- 2. The Use of the Semantic Web as a blueprint**
- 3. The embedding of semantics into the distribution flow**



data.vlaanderen.be ●



Flanders  
State of  
the Art



@rafke

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